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**From:** DIO ODC-IPS SG2a  
**Sent:** 10 April 2014 14:30  
**To:**  
**Subject:** Release-authorised: Hill of Lychrobbie wind turbines your ref: 19464 FAO

**Attachments:** Report\_14-675-WHA-1.pdf; Berriedale and Dunbeath community cluster support letter-gibson-04-03-14.pdf



Report\_14-675-WH Berriedale and  
A-1.pdf (384 K... Dunbeath commun..

I am very sorry for the delay in getting back to you on this. The report you provide is detailed and collating a response has involved input from a number of MOD Subject Matter Experts. I am still awaiting some feedback, but hope to be in a position to get back to you next week. I hope that this is acceptable.

Kind regards

Safeguarding Officer - Infrastructure Professional Services  
- Safeguarding

DIO Operations Development and Commerce

Defence

Infrastructure

Organisation

Telephone: | MOD Telephone: | Fax:

Email:

Website: [www.gov.uk/mod-safeguarding](http://www.gov.uk/mod-safeguarding)

-----Original Message-----

**From:**  
**Sent:** 06 March 2014 16:49  
**To:** DIO ODC-IPS SG2  
**Subject:** Hill of Lychrobbie wind turbines your ref: 19464 FAO

I am writing in regards to a recent objection from the MOD to the proposed Lychrobbie wind turbines, your reference 19464, planning application reference number 13/04194/FUL. For this application wind harvest is being put at an appeal on behalf of the two landowners who have decided to make this project a community project by giving two of the three wind turbines to a local community.

With the refusal at appeal of the Dunbeath wind farm, the proposed Lychrobbie wind turbines represent an important chance for the local community to benefit and contribute to the low carbon economy. An aviation study has been commissioned to study the case closely and I hope to be in a position to get back to you next week. I hope that there is merit in looking at the case. I am still awaiting some feedback, but hope to be in a position to get back to you next week. I hope that this is acceptable.

request that the assessment is revisited by the MoD with a view to lifting the objection, as per the attached report.

This project has a great deal of local support, including from the Member of Scottish Parliament for the area, Rob Gibson, and I have included his letter of support.

Regards,

Wind Harvest



**HILL OF LYCHROBBIE WIND FARM:  
ASSESSMENT OF IMPACT ON RAF LOSSIEMOUTH  
PRIMARY SURVEILLANCE RADAR**

**February 2014**

**Report No.14/675/WHA/1**

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## 1. Introduction

1.1 This report assesses the potential impact of a proposed wind farm at Hill of Lychrobbie, Dunbeath, Highland, on the operation of the air traffic control primary surveillance radar at RAF Lossiemouth. This work was commissioned by Wind Harvest Ltd on 13 January 2014.

1.2 The proposed Hill of Lychrobbie wind farm consists of three turbines, 74 metres above ground level to blade tip, located at the following grid references:

<i>Turbine no.</i>	<i>Easting</i>	<i>Northing</i>
T1	317205	932065
T2	317140	932179
T3	317067	932288

## 2. MoD consultation history

2.1 The MoD responded to consultation on the planning application for the Hill of Lychrobbie proposal on 5 December 2013 with a letter of objection stating that “the turbines will be 62.8 km from, detectable by, and will cause unacceptable interference to the ATC radar at RAF Lossiemouth.”

2.2 There are several other wind farm developments within 10 nautical miles of Hill of Lychrobbie and which could, therefore, generate cumulative impacts on the Lossiemouth radar with the Hill of Lychrobbie development. These are summarised in Table 1, including the MoD response. Their locations are shown in Figure 1.

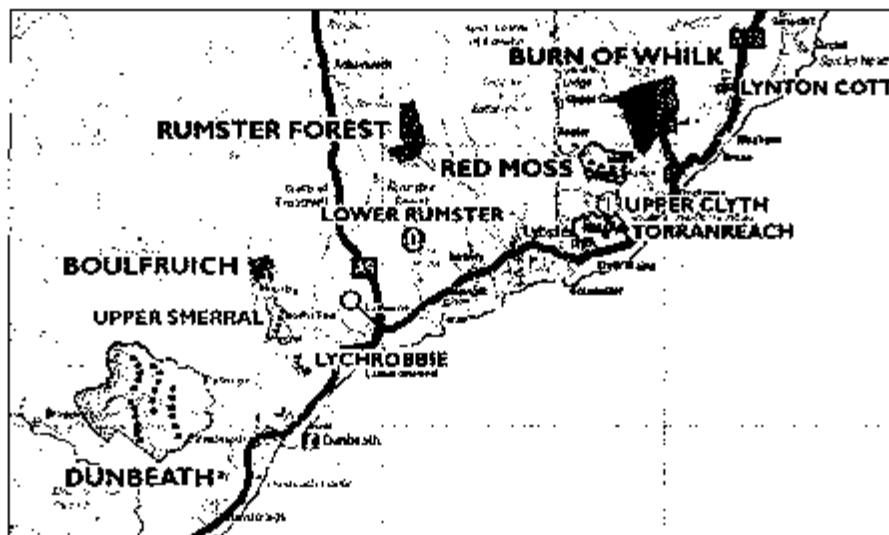


Figure 1: Wind turbine projects within 10nm of Hill of Lychrobbie

**Table 1: Wind turbine projects within 10nm of Hill of Lychrobbie<sup>1</sup>**

Project name	No. and size of turbines	Planning reference no.	D/O ref no.	Planning status	MoD response
Buolfruch	15 x 70m	-	-	Operational since Oct 2005	No objection
Dunbeath	17 x 125m	IEC/3/158	-	Refused June 2013 (landscape & visual)	Initial objection on grounds of impact on Lossiemouth radar, subsequently withdrawn
Upper Smerral	4 x 80m	10/03501/FUL	10814	Refused 23 April 2012 (noise, shadow flicker & visual)	Objection to 104m turbines; no objection to 84m turbines
Newlands of Houshy	3 x 67m	13/03555/FUL	19233	Pending decision	Objection 24-10-13, withdrawn 15-1-14 on basis of proposed technical mitigation
Rumster Forest	3 x 75m	11/04522/FUL	5627	Pending decision (recommendation to consent)	No objection
Lower Rumster	1 x 80m	13/01201/FUL	18143	Refused 28-10-13 (landscape & visual)	No objection
Upper Clyth	1 x 74m	13/01215/FUL	18171	Pending decision	No objection
Burn of Whilk	9 x 116m	06/00676/FUL	-	Consented Apr 2011. Under construction	No objection

Excludes turbines less than 40m in height to blade tips.

### 3. Radar line of sight

3.1 The radar line of sight from the primary surveillance radar at RAF Lossiemouth to the blade tip height of each of the proposed Hill of Lychrobbie turbines was assessed using Global Mapper software, based on ASTER GDEM digital terrain data with a resolution of approximately 45 metres. These data were supplemented in the area between the radar head and the southern coastline of the Moray Firth with Ordnance Survey Landform Profile data with a resolution of five metres.

3.2 The results are shown in Figures 2 to 4. They show that while there is a direct line of sight, the radar path to the blade tips clears the terrain within 2km of the radar by the relatively small margin of 2.3 metres.

3.3 Analysis of the location of buildings on the north side of RAF Lossiemouth shows that the path from the radar to all three turbine locations at Hill of Lychrobbie passes over a series of buildings with roof heights estimated at between 3 and 5 metres above ground level. These buildings are shown in Figure 5.

3.4 Neither the radar line of sight plots shown in Figures 2 to 4, nor the MoD's assessment of line of sight, take account of buildings. The effects of the buildings in this case on the ability of the Lossiemouth PSR to detect the Hill of Lychrobbie turbines will be complex, consisting of the physical blocking of part of the radar beam, offset to some extent by the diffraction of the beam over the roofs of the buildings, but also subject to attenuation of the signal as it passes close to the sea surface in the first 20km of its path from the radar. The combined effect of these phenomena is difficult to model accurately. In this situation the most reliable indicator of whether the Lossiemouth PSR is likely to detect the Hill of Lychrobbie turbines would be to determine whether existing turbines at similar bearings and elevations are detected in practice by the radar.

3.5 Plots of the line of sight from the Lossiemouth PSR to the Buolfruch, Dunbeath, Upper Smerral, Newlands of Houstry, Rumster Forest, Lower Rumster, Upper Clyth and Burn of Whilk turbines are illustrated in Figures 6 to 13.

3.6 It can be seen from Figure 6 that the lowest of the fifteen existing turbines at Buolfruch has a similar radar line of sight path to that of the Hill of Lychrobbie turbines, with 2.2m minimum terrain clearance on the coast a short distance north of the radar. The remaining fourteen turbines have minimum terrain clearances between 2.2 and 2.6 metres. The path to these turbines also passes over the buildings shown in Figure 5, and may be more significantly constrained than the Hill of Lychrobbie turbines due to the hangar on the right of the photograph. These turbines have been in operation since 2005 so if any of the turbines are detectable by the radar, this will be well known to controllers.

3.7 Figure 7 shows that the line of sight to the Dunbeath turbines had significantly greater terrain clearance than the path to Hill of Lychrobbie. However all radar paths to the Dunbeath turbines crossed the large hangar shown in Figure 6. This may have rendered the turbines undetectable. Nevertheless the MoD did assess the turbines as being detectable by the Lossiemouth radar, only withdrawing its objection after lengthy consultations with the developer. The reason for the change in MoD position on Dunbeath is not known.

3.8 Figures 8 and 9 show that the line of sight to the Upper Smerral and Newlands of Houstry turbines has greater terrain clearance than the path to Hill of Lychrobbie. These radar paths are subject to the same building constraints as the paths to Hill of Lychrobbie. It should be noted that the MoD originally objected to 104m turbines at Upper Smerral (minimum terrain clearance 3.6 metres), but did not object to 84m turbines at the same locations (minimum terrain clearance 3.2 metres). However they have more recently objected to 67m turbines at similar locations (minimum terrain clearance 2.9 metres).

3.9 Figures 10 and 11 show that the line of sight to the Rumster Forest and Lower Rumster turbines has minimum terrain clearance of at least 2.7 metres – greater than the paths to Hill of Lychrobbie. However the paths to the Rumster Forest and Lower Rumster turbines are not constrained by buildings on the airfield so these turbines are likely to be more detectable by the radar than the Hill of Lychrobbie turbines. It should be noted that the MoD has issued 'no objection' responses to these developments as recently as April 2013.

3.10 Figures 12 and 13 show that the line of sight to the Upper Clyth and Burn of Whilk turbines has minimum terrain clearance of at least 4 metres – again, greater than the paths to Hill of Lychrobbie. The paths to these turbines are not constrained by buildings on the airfield so these turbines are likely to be more detectable by the radar than the Hill of Lychrobbie turbines. The MoD issued a 'no objection' response to the Upper Clyth turbine as recently as April 2013.

3.11 To conclude this section, it is clear that the MoD has approved turbines in locations close to Hill of Lychrobbie, but more visible to the radar, as recently as April 2013.

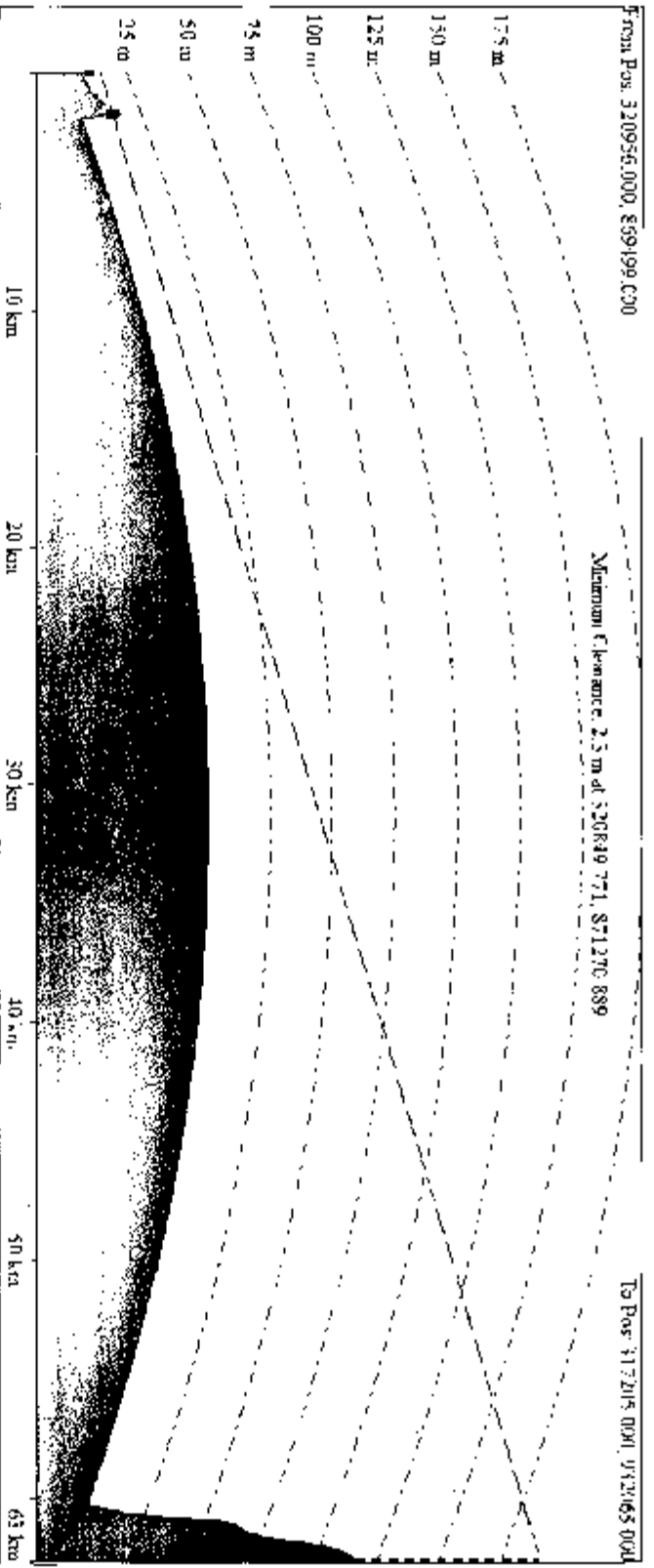


Figure 2: Radar line of sight from RAF Lossiemouth PSR to blade tips of Hill of Lychrobbie Turbine 1



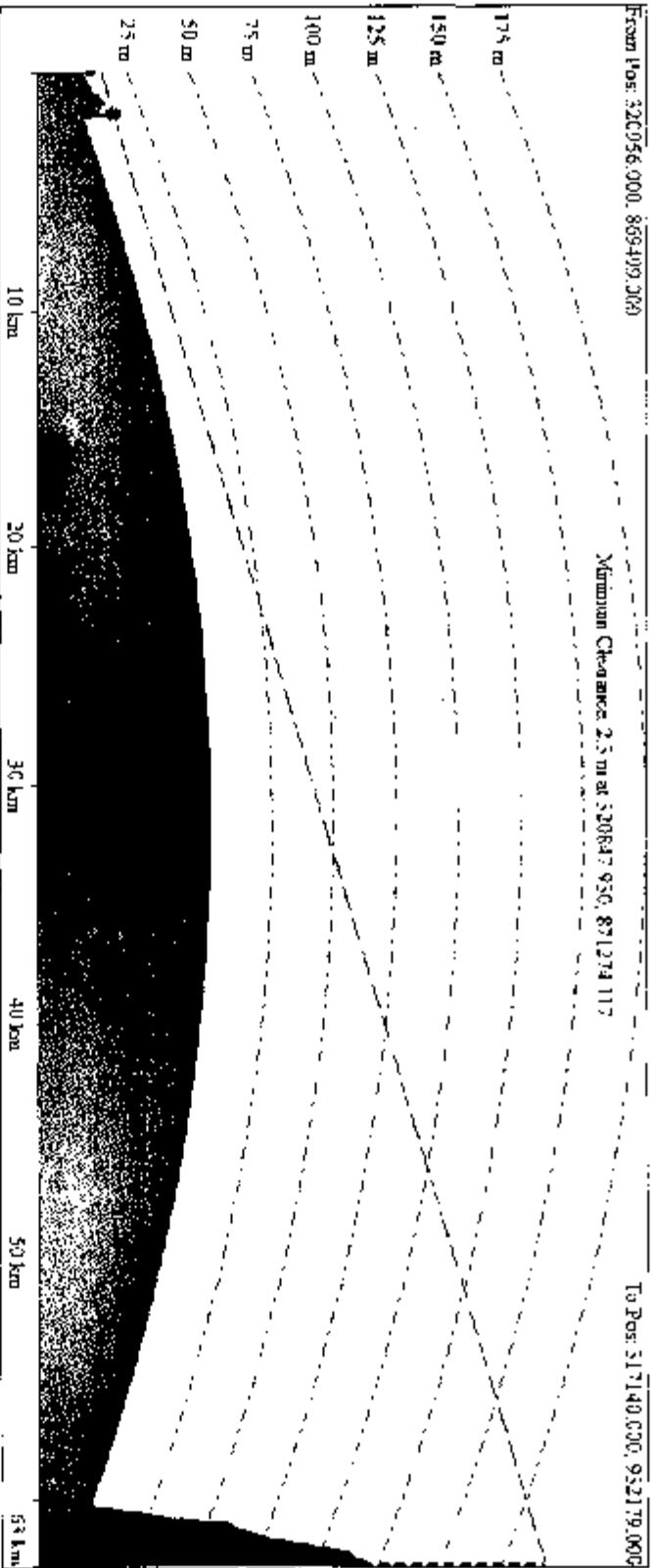


Figure 3: Radar line of sight from RAF Lossiemouth PSR to blade tips of Hill of Lychrobbie Turbine 2

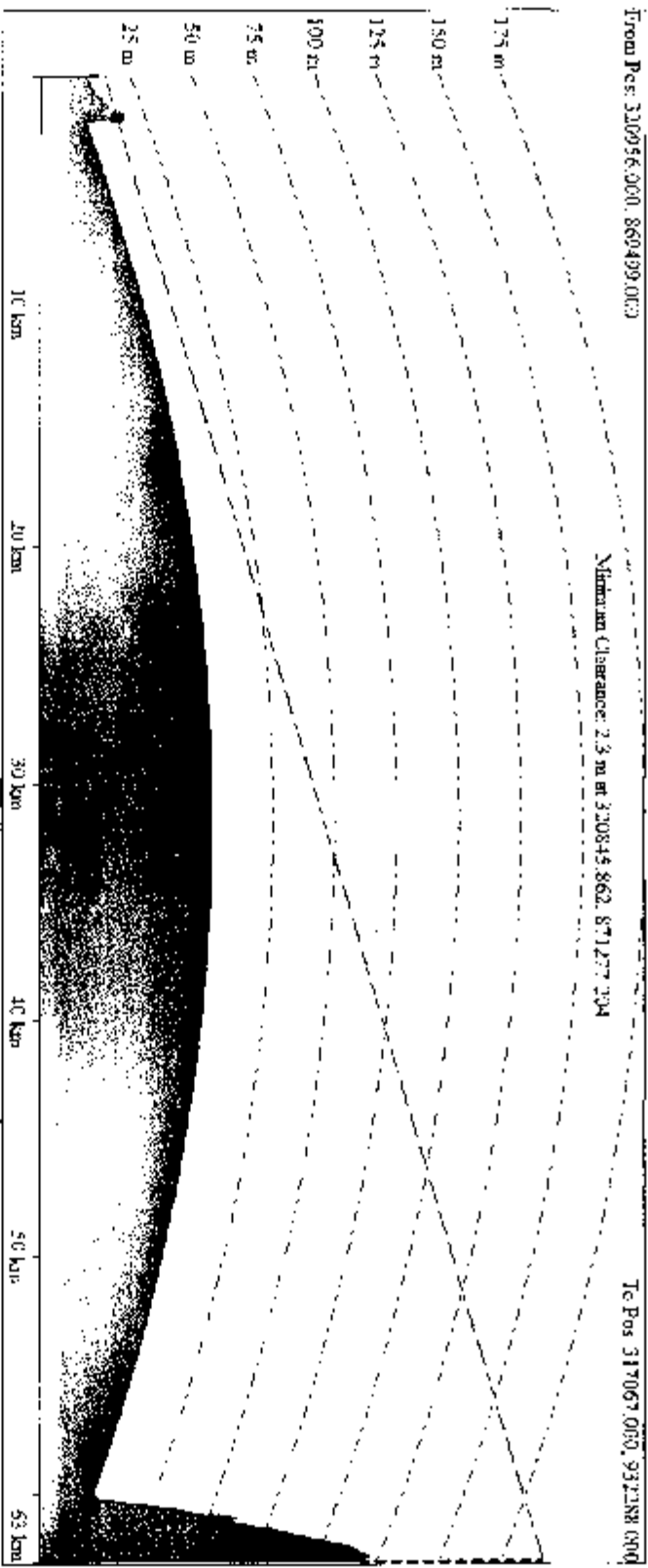


Figure 4: Radar line of sight from RAF Lossiemouth PSR to blade tips of Hill of Lychrobbie Turbine 3



Figure 5: Buildings on the north side of RAF Lossiemouth, looking towards the radar from the direction of Hill of Lychrobbie

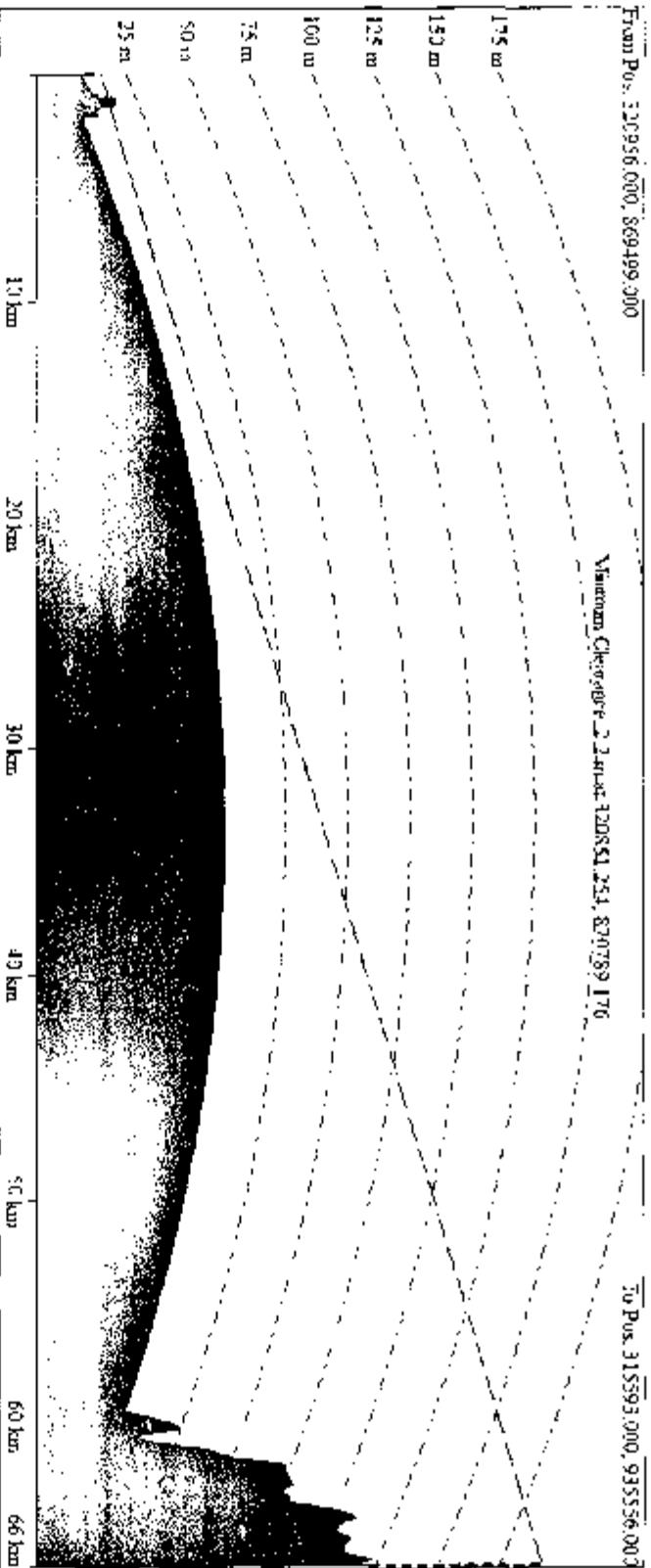


Figure 6: Radar line of sight from RAF Lossiemouth PSR to blade tips of Buolfruch Turbine 8 (lowest of the 15 turbines)

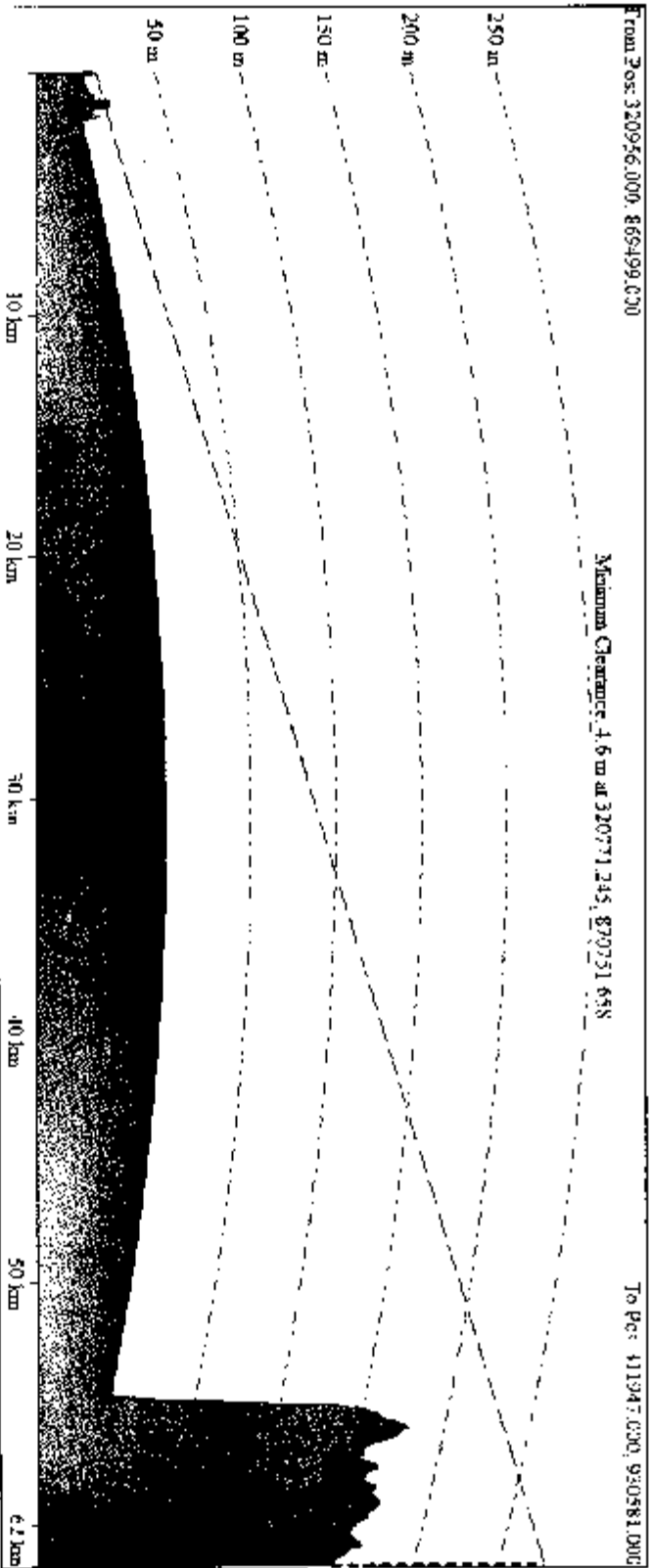


Figure 7: Radar line of sight from RAF Lossiemouth PSR to blade tips of Dunbeath Turbine 17

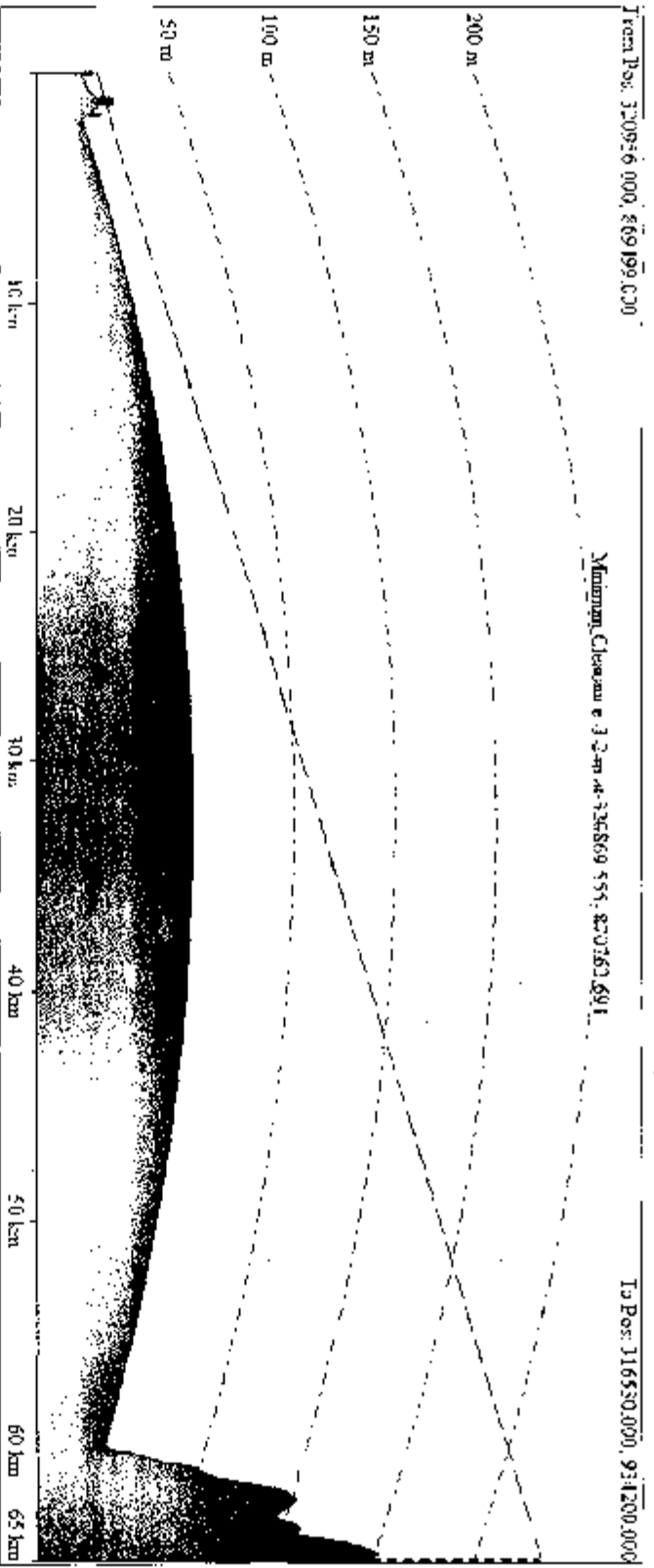


Figure 8: Radar line of sight from RAF Lossiemouth PSR to blade tips of Upper Smeral Turbine 1 (at 84m)

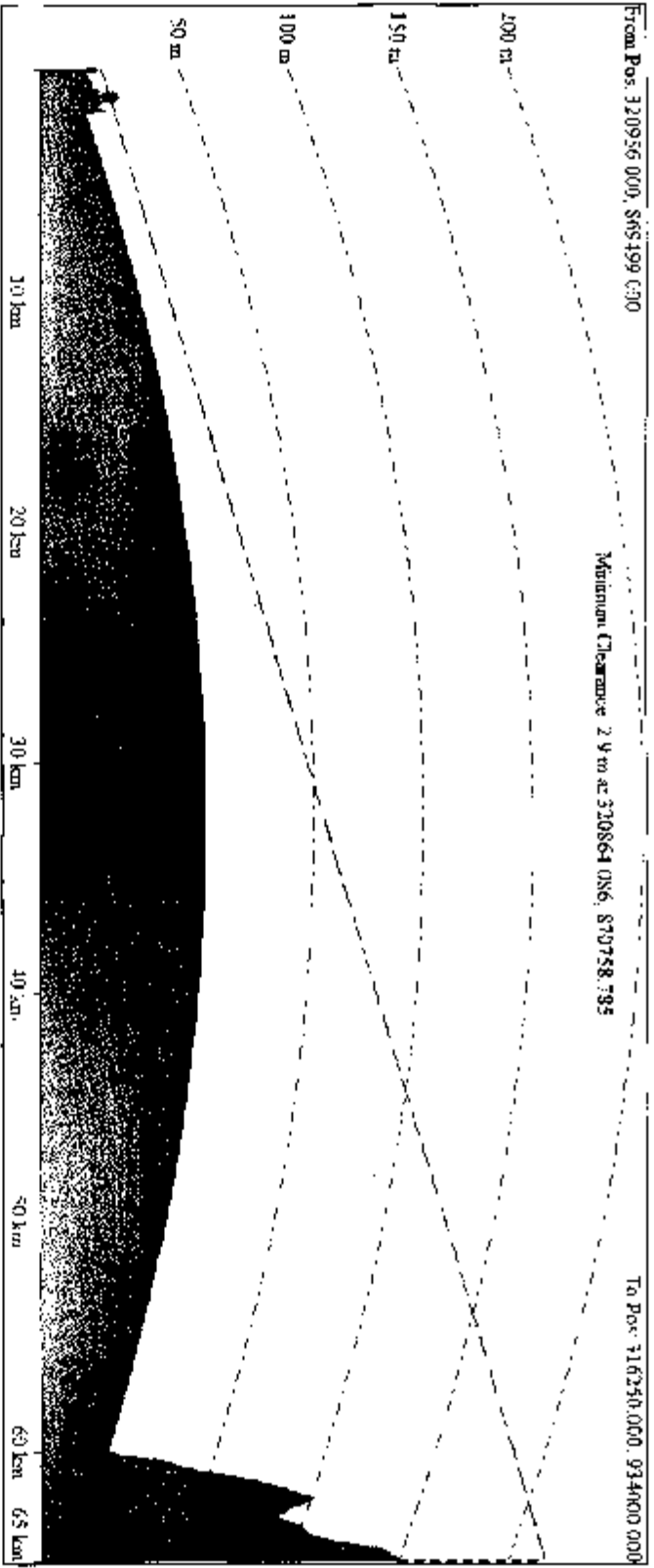


Figure 9: Radar line of sight from RAF Lossiemouth PSR to blade tips of Newlands of Housty Turbine 3

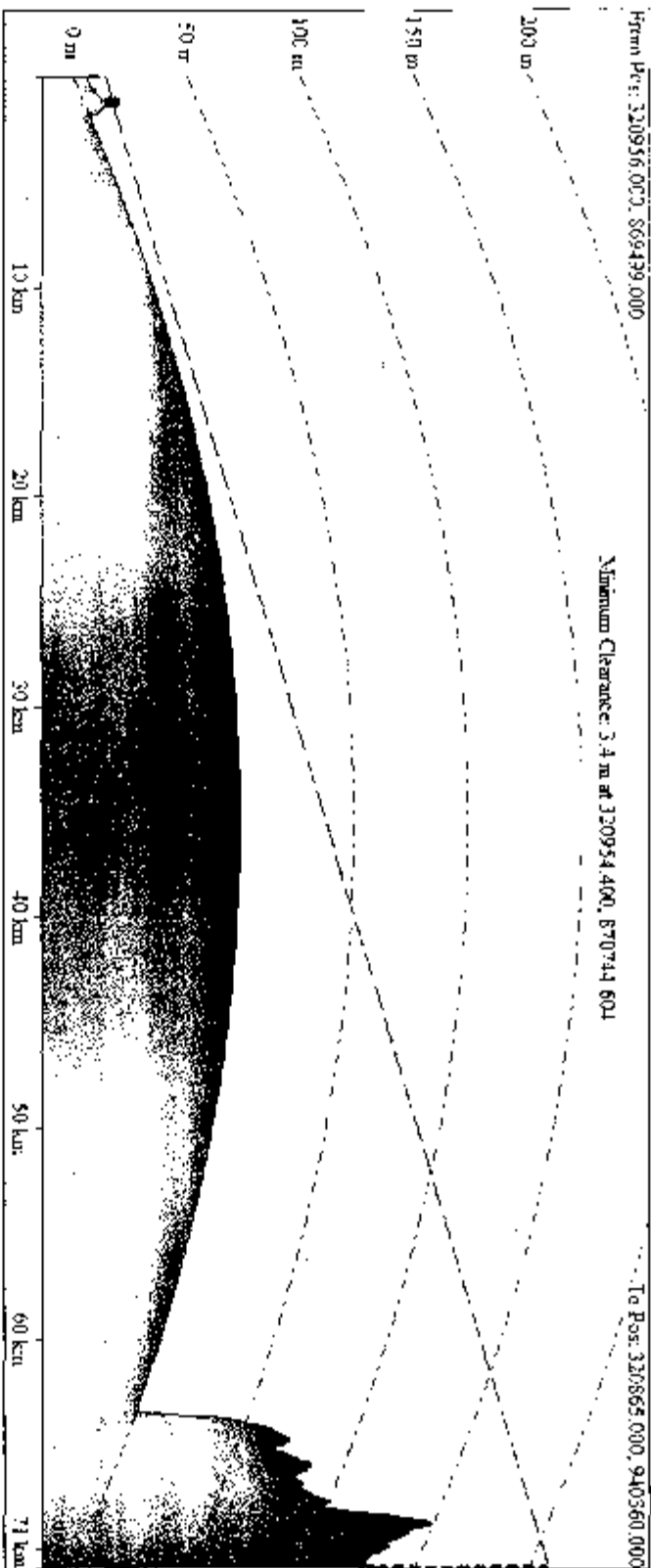


Figure 10: Radar line of sight from RAF Lossiemouth PSR to blade tips of Runster Forest T3 (lowest of the three turbines)



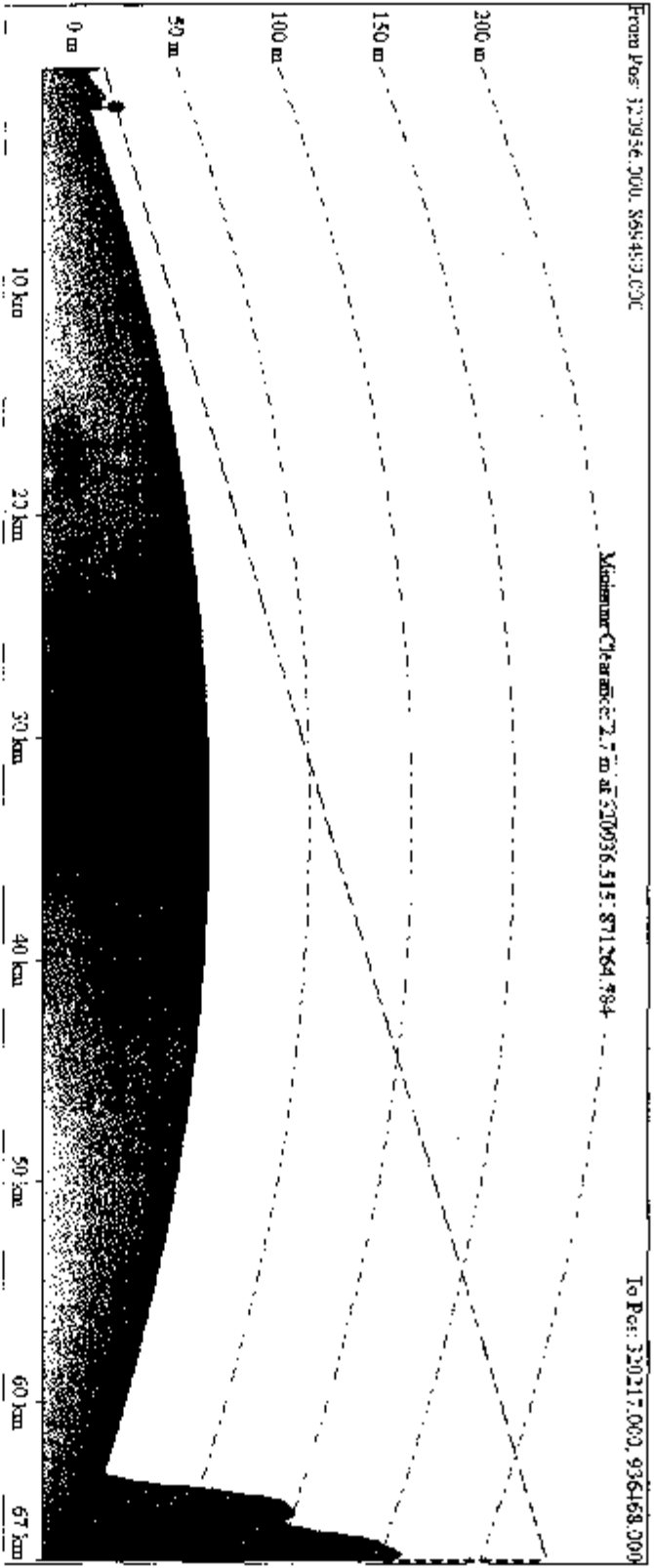


Figure 14: Radar line of sight from RAF Lossiemouth PSR to blade tips of Lower Runster turbine

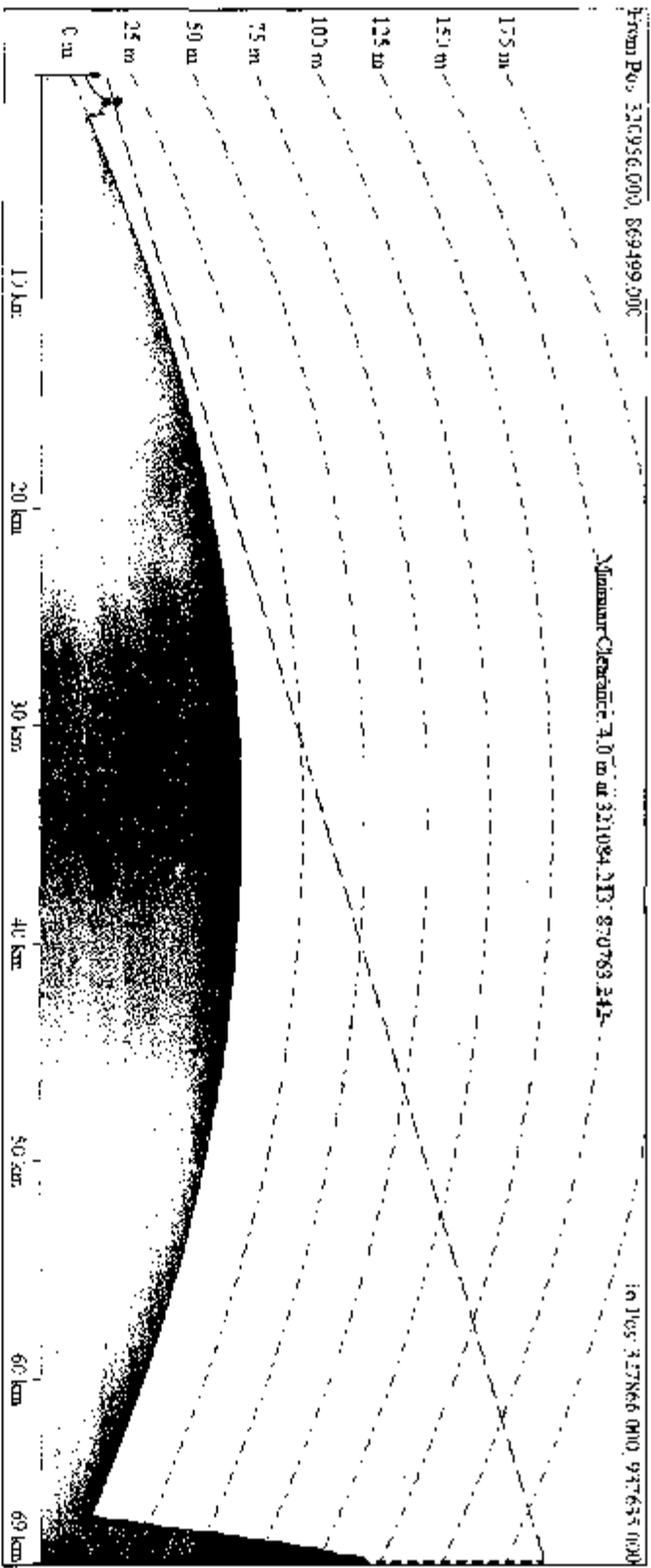


Figure 12: Radar line of sight from RAF Lossiemouth PSR to blade tips of Upper Clyth turbine

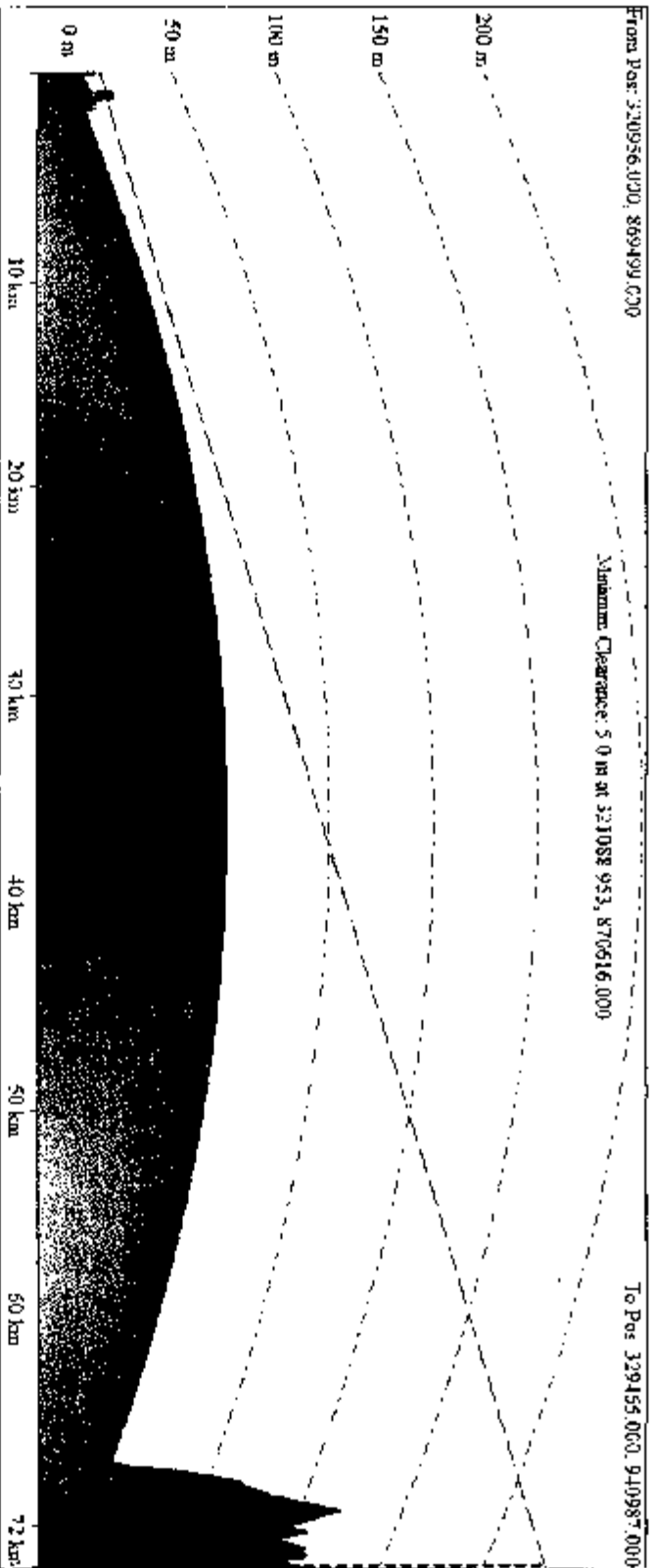


Figure 13: Radar line of sight from RAF Lossiemouth PSR to blade tips of Burn of Whilk Turbine 11 (lowest of the 11 turbines)

#### 4. Operational assessment

4.1 There is some doubt about the capability of the Lossiemouth PSR to detect turbines in the vicinity of Hill of Lychrobbie. However the MoD has been content to accept turbines in more visible positions than Hill of Lychrobbie, as recently as April 2013.

4.2 Full understanding of the extent of Lossiemouth radar visibility in this area would require observation of the Lossiemouth radar display, or at the very least, ascertaining from current Lossiemouth controllers whether they observe clutter in that area. It is unlikely that this process has been undertaken as a basis for the MoD's decisions on any of the turbines in this area.

4.3 The operational impact of existing radar-visible wind turbines within the radar coverage area of RAF Lossiemouth is best measured by interrogating the Ministry of Defence flight safety occurrence report database. This contains all reports submitted by controllers where they consider that safety may have been affected. Data up to the end of 2012 show that there have been no reported incidents associated with wind turbines reported by controllers at RAF Lossiemouth, nor indeed by controllers at any RAF airfield or air traffic control unit. This is particularly notable since the area to the south of RAF Lossiemouth contains three wind farms, all of which are regularly visible on the radar, and which have been in operation since 2005, as well as the two offshore turbines in the Beatrice Field which have been operational since 2007.

#### 5. Conclusions

5.1 It is concluded from the above that there is no evidence of existing operational wind turbines within line of sight of the RAF Lossiemouth radar having a negative impact on flight safety.

5.2 Turbines which are predicted to be more visible to the Lossiemouth radar than Hill of Lychrobbie have been approved by the MoD within the past year.

5.3 In view of the uncertainty concerning the radar detectability of turbines along the north coast of the Moray Firth, the MoD should be requested to ascertain whether any existing turbines in that area are displayed on the Lossiemouth radar.



The Scottish Parliament  
Pàrlamaid na h-Alba

4 Grant Street, Wick, KW1 5AY,  
Room M4.06, Scottish Parliament, Edinburgh EH99 1SP.

04/03/14

To whom it may concern,

I would like to register my full support for the Berriedale and Dunbeath community wind cluster. This community endeavour will lead to much needed income for the area.

Community turbines have had a proven track record in the Highlands and Islands as well as beyond in acting as a positive way for the community and environment providing much needed income as well as clean green and sustainable energy.

Indeed in the climate change era, a safe, sustainable and clean energy supply is needed. This proposal is part of that and therefore merits support.

Yours sincerely,

**Rob Gibson MSP**